Title of project: Development of Velvet Bentgrass Sod as an Environmentally Compatible Turfgrass less Reliant on Fertilizers and Pesticides

Project leader:
Frank S. Rossi, Ph.D.

Abstract

Turfgrass disease management is a significant problem and rated the greatest challenge facing the turf industry based on the 2003 NY State Turfgrass Industry Survey. If sod farmers were able to produce a crop that required less pesticides to maintain they would be able to increase their marketing programs and overall pesticide use could decline. This project was designed to investigate the production and management of two velvet bentgrass varieties for potential as a sod and develop a management practices for golf course superintendent's who desire to grow velvet sod. This is the second year of a two-year study. In year one, establishment studies indicated that lower seed rates were slower to reach adequate density (>85%) than normal or above normal seed rates and SR 7200 was less susceptible to diseases such as dollar spot and take-all patch than Vesper velvet bentgrass. Management factors such as low pH (5.3 or less), nitrogen fertility less than 2.0 lbs of nitrogen per 1000 ft2, and frequent grooming and topdressing provided the most desirable stand. In year two we introduced three traffic levels to determine the effects of traffic and pH on velvet bentgrass performance. SR7200 maintained higher turfgrass quality ratings than Vesper independent of pH or traffic treatment. Both varieties seem to perform best at pH 5 and neither provided acceptable quality when traffic exceeded 20,000 per year. This two year study suggest some important establishment, varietal, pest management and functional aspects of velvet bentgrass that will enable sod producers to more effectively market this species to the golf turf industry.

Justification

New York is one of the most restrictive regulatory environments in the US regarding pesticide use. IPM Focus Group sessions identified environmental regulations, pesticide use, and development of new varieties less dependent on pesticides and reduction of chemical use as major threats, opportunities and changes that could make a difference to sod farmers in NY.

If sod farmers were able to produce a crop that required less pesticides to maintain they would be able to increase their marketing programs into golf courses. Golf courses spent over $17 million dollars on fungicides for turf diseases, as compared to only $4 million by homeowners in 2003. Clearly turfgrass disease management on golf courses is significant problem and rated the greatest challenge facing the golf turf industry.

Velvet bentgrass (*Agrostis canina*) has been shown in several studies to require significantly less pesticides, fertilizer and water than traditional turfgrass varieties. However, few sod farms are producing velvet sod and consequently golf course superintendents are not able to use this important species.

This study is designed to determine important establishment, varietal, pest management and traffic tolerance of velvet bentgrass. This improved understanding will assist sod producers in effectively marketing this important golf turf species and reduce reliance on chemical pesticides.

Objectives

The objectives of this project were to:
1. Determine influence of pH and traffic on velvet bentgrass varieties.

Procedures:

1. Determine influence of pH and traffic on velvet bentgrass varieties.

Two varieties (vesper and SR 7200)of velvet bentgrass sod (donated by DeBuck Sod Farms) were delivered and installed at the Turf Center in Ithaca, NY in July 2005. The sod was planted on an Arkport fine sandy loam, pH 6.3.

Immediately following successful rooting the sod was cored every month and heavily topdressed with sand. In addition, each variety was split into three 48 square foot subplots and elemental sulfur and ammonium sulfate applied regularly to two of the three plots to reduce the pH to about 4.0 and 5.0.

Mowing was performed daily with walk behind reel mowers at 0.130" and clippings collected. The research area was maintained to championship conditions with light frequent liquid fertilization applied weekly during the season. Total nutrient rates for the season was 1.75 lbs. N, 0.15 lbs. P and 0.50 lbs. K, 2 lbs. S, 0.5 lb Mn (reduce take-all patch) per 1000 square feet, with iron sulfate to improve turfgrass color.

Golf traffic is simulated daily during the season using a modified traffic device with two 0.5 meter diameter rollers that spin at different speeds to create slipping. The rollers are fitted with SoftSpikes. The amount of spikes and passes used are designed to simulate 20,000, 40,000 or 60,000 rounds of golf per year.

Data were collected for turf quality. Data analysis was conducted using linear mixed models with compound symmetric covariance structure to assess overall treatment effects when repeated measurements were made on the same experimental unit over time. Treatment differences at individual measurement events were evaluated using analysis of variance and Fisher's protected least significant difference (LSD). The MIXED and GLM procedures in SAS/STAT software version 9.1 (SAS, Cary, NC) were used to perform the analyses.

Results

pH

The first year of he study indicated that pH of 5.4 and below provided the highest quality turf and the least amount of disease suggesting that velvet bentgrass will perform well at low pH. In addition, the improved variety SR 7200 had significantly less take-all patch at similar pH levels compared to the older variety Vesper.

In year two there were no significant disease infestations. This supports two existing research findings. First, take-all patch infestations typically subside over time especially when treated regularly with light frequent applications of $MnSO_4$. Second, velvet bentgrass is generally resistant to most major turfgrass diseases and therefore requires significantly less pesticide input than traditional creeping bentgrass and annual bluegrass species.

Turfgrass quality was significantly reduced in year two with only one date when acceptable turfgrass quality was produced. Furthermore, there was no significant difference between velvet bentgrass varieties averaged over the pH levels. This might be a result of the aggressive acidifying program conducted in 2007 to

further reduce soil pH levels. Over time as less aggressive acidifying programs are implemented it is likely turfgrass quality will be improved.

Table 1. Effect of soil pH on quality ratings of SR 7200

pH	Turf Quality				
	17-Jul	6-Aug	20-Aug	30-Aug	8-Sept
4.0	5.8	5.5	5.4	5.8	5.8
5.0	5.6	5.3	4.9	5.8	6.1
6.0	5.6	5.4	5.2	5.8	5.7
LSD (p=0.05)	NS	NS	N/A*	NS	0.2

*Turfgrass quality rated on scale of 1 to 9; 1=dead turf, 9=perfect turf, 6= acceptable turf

Table 2. Effect of soil pH on quality ratings of Vesper

	17-Jul	6-Aug	20-Aug	30-Aug	8-Sept
4.0	5.2	5.2	5.1	4.5	5.1
5.0	5.5	5.3	4.6	4.7	5.7
6.0	5.5	5.4	4.8	4.8	5.3
LSD (p=0.05)	0.2	NS	N/A*	0.2	N/A**

*Turfgrass quality rated on scale of 1 to 9; 1=dead turf, 9=perfect turf, 6= acceptable turf

Traffic

There were significant main effects for velvet bentgrass cultivar and a few dates when a significant interaction between pH and traffic level existed. In general, SR7200 provided higher turf quality ratings than Vesper independent of pH and traffic level.

These data suggest that more than 20,000 rounds of golf per year reduce turfgrass quality ratings below acceptable levels. SR7200 maintained acceptable quality on three of the five rating dates while Vesper produced acceptable quality on only one of five dates.

Table 3. Traffic effects on turfgrass quality of SR7200 velvet bentgrass

Traffic	Turf Quality*				
Rounds per yr.	17-Jul	6-Aug	20-Aug	30-Aug	8-Sept
20,000	6.1	5.4	5.7	6.6	6.6
30,000	5.5	5.6	5.2	5.7	5.8
60,000	5.5	5.2	4.7	5.1	5.1
LSD (p=0.05)	0.2	NS	N/A*	0.1	0.2

*Turfgrass quality rated on scale of 1 to 9; 1=dead turf, 9=perfect turf, 6= acceptable turf

Table 4. Traffic effects on turfgrass quality of Vesper velvet bentgrass

Traffic	Turf Quality				
Rounds per yr.	17-Jul	6-Aug	20-Aug	30-Aug	8-Sept
20,000	5.7	5.6	5.4	5.3	6.1
30,000	5.3	5.3	4.8	4.6	5.4
60,000	5.1	5.0	4.3	4.2	4.6
LSD (p=0.05)	0.2	0.2	N/A*	0.2	N/A**

*Turfgrass quality rated on scale of 1 to 9; 1=dead turf, 9=perfect turf, 6= acceptable turf

Implications

Velvet bentgrass production is a viable niche market for sod producers, however the long-term effect of seed rate on harvest interval could not be evaluated in this study. Still, as with most sod the longer it remains on the farm the less profitable it will be, especially with velvet bentgrass that will require more intense maintenance.

Velvet bentgrass does have significant disease resistance but obviously it is not immune to disease as evidenced by the high levels of take-all patch observed at pH above 5.4 on the Vesper variety in 2006. However, no significant disease infestation occurred on either variety in 2007.

The first year suggested that selecting the best variety in combination with pH management leads to reduction in disease and reduced fungicide use. However the second year including MnSO4 in the nutrient management program seemed to suppress further infestation of take all patch independent of pH and traffic level. This would be a viable recommendation for sod producers to make to prospective clients.

There appears to be traffic limits that can be imposed on velvet bentgrass. Turfgrass quality was significantly reduced above 20,000 rounds per year independent of variety and pH. In fact, there were no dates when acceptable quality was achieved when traffic levels above 20,000 rounds per year.

This traffic finding is not consistent with previous research from Murphy et al. (2001) who indicated that velvet bentgrass was more traffic tolerant than other creeping bentgrass varieties and a perennial biotype of annual bluegrass. In that study, wear was separated into abrasive stress and compaction, whereas in our study we used actual golf spike traffic to impose the wear treatment.

It appears there are important limitations to using velvet bentgrass such as traffic and nutrient management. Clearly, velvet bentgrass offers significant opportunities for reducing reliance on chemical pesticides. Further research is required to more fully elucidate successful management strategies.